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Sick

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[54] **APPARATUS FOR TREATMENT OF YARNS AND WEB-LIKE MATERIAL**

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June 17, 1971 Switzerland 8849/71

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[51] **Int. Cl.** **B05c 8/02**

[58] **Field of Search** ..... 68/8, 150, 189, 198, 210; 294/67 AA

[56] **References Cited**

UNITED STATES PATENTS

2,792,702	5/1957	Newcomb et al.	68/189
2,872,802	2/1959	Bellmann	68/150
3,357,212	12/1967	Schiffer	68/8
3,596,481	8/1971	Wilcox	68/150

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Assistant Examiner—Philip R. Coe
Attorney, Agent, or Firm—Fitzpatrick, Cella, Harper & Scinto

[57] **ABSTRACT**

A machine for full width treatment of textile material wound onto a perforated beam wherein a chamber is mounted on a frame with supports extending into the chamber for receiving the beam from a transport device, the beam being supported at both ends during rotation for treatment, one support holding the beam during transfer from the transfer device.

11 Claims, 8 Drawing Figures

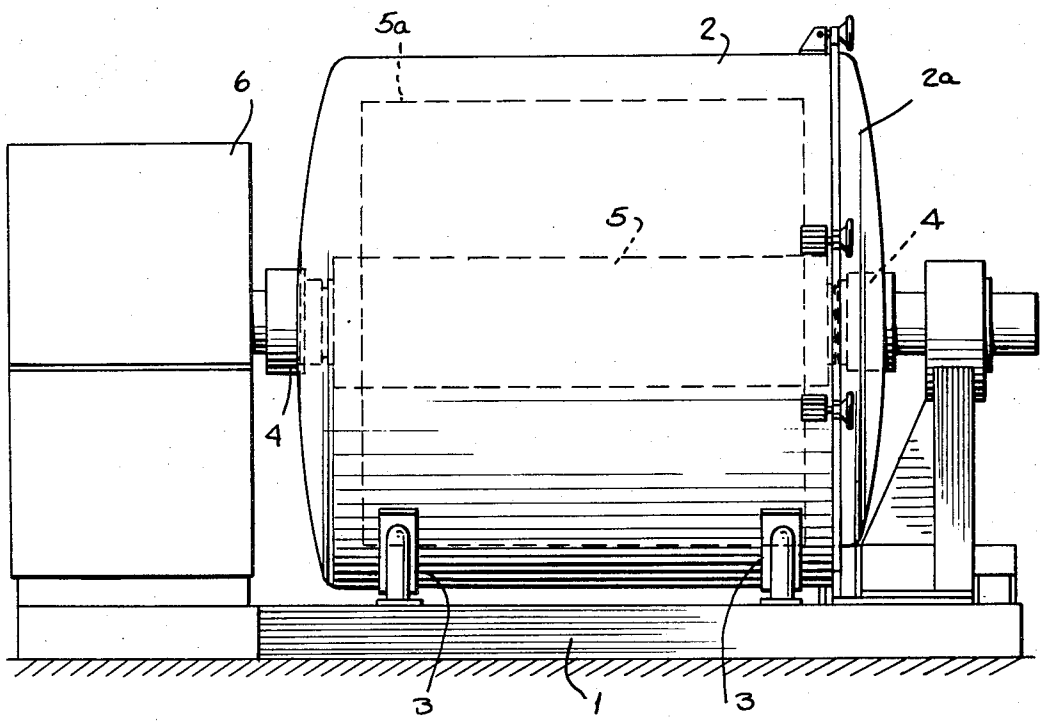


Fig. 1.

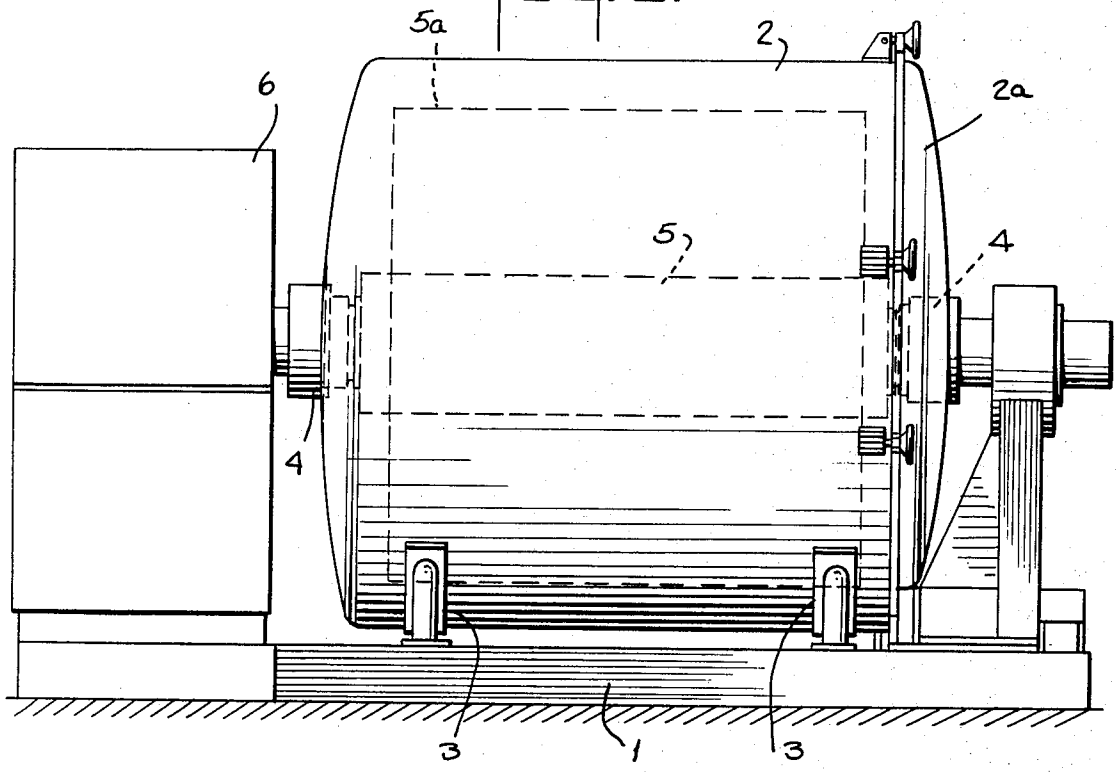


Fig. 2

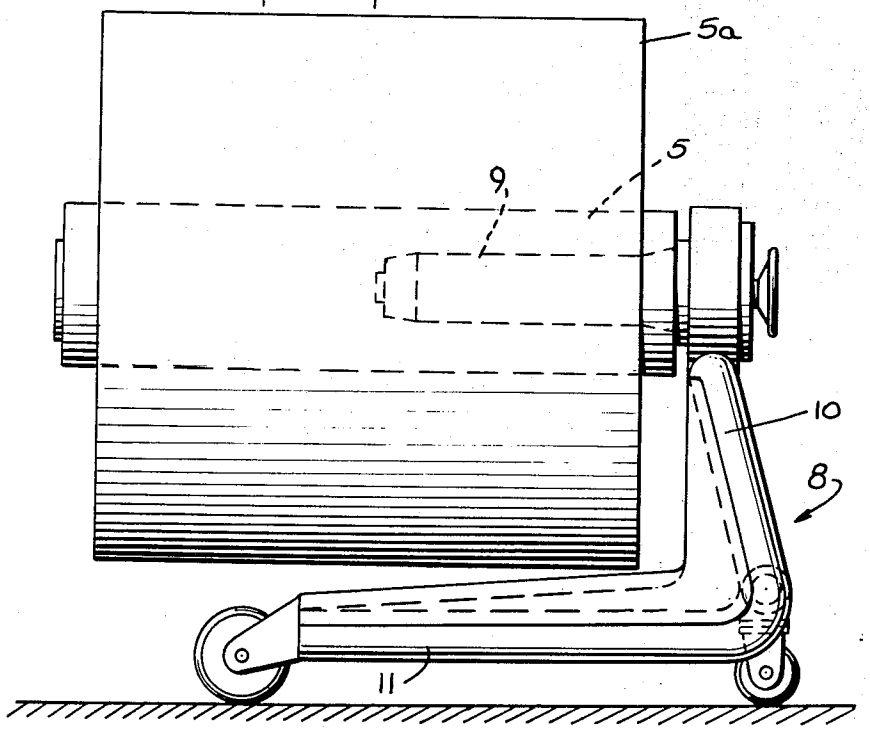


Fig. 4.

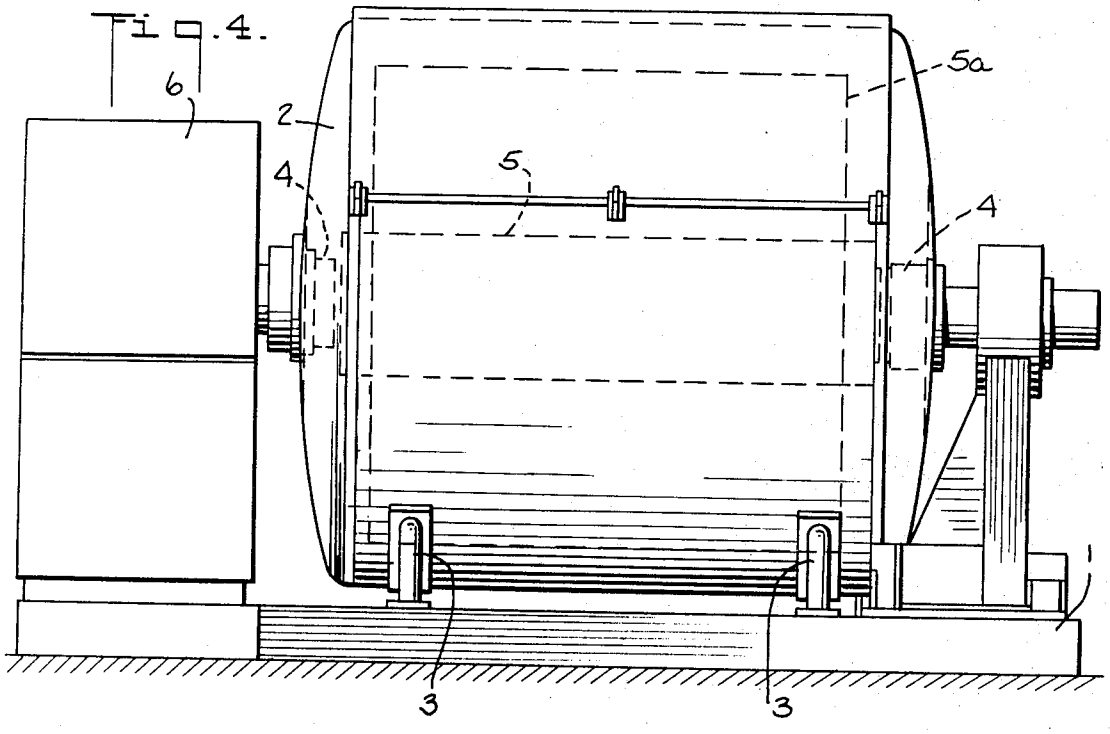
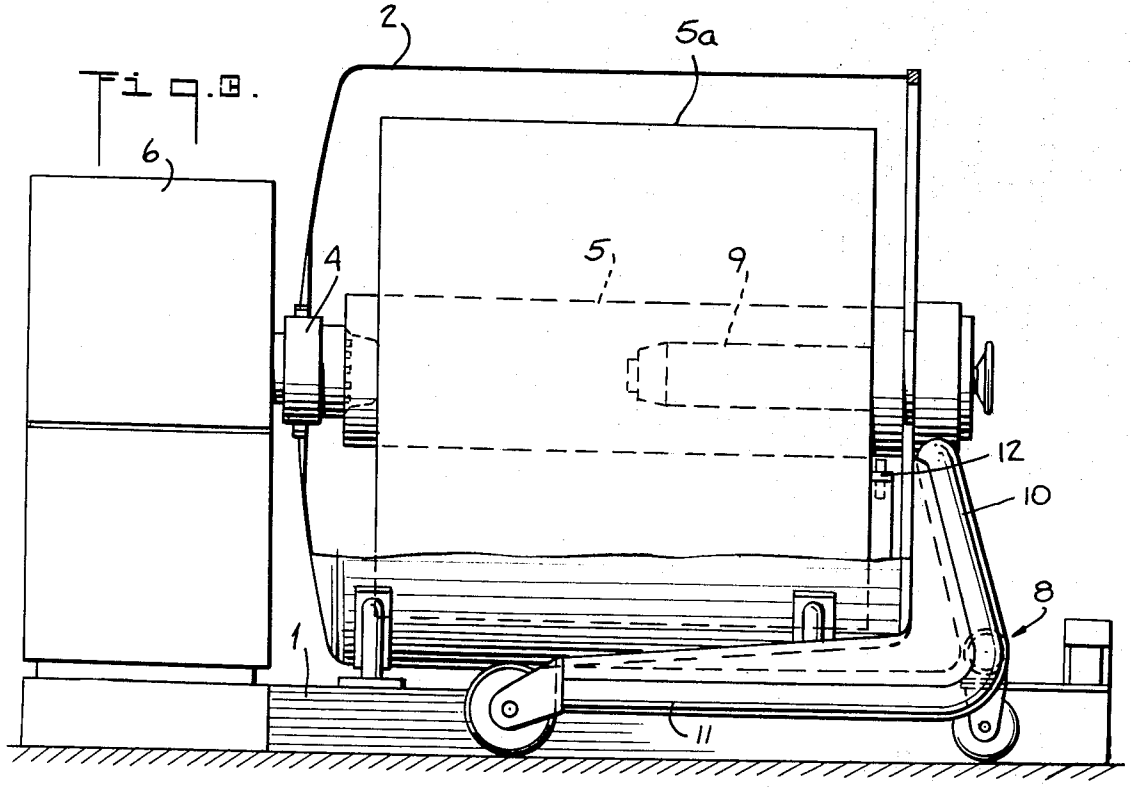


Fig. 8.



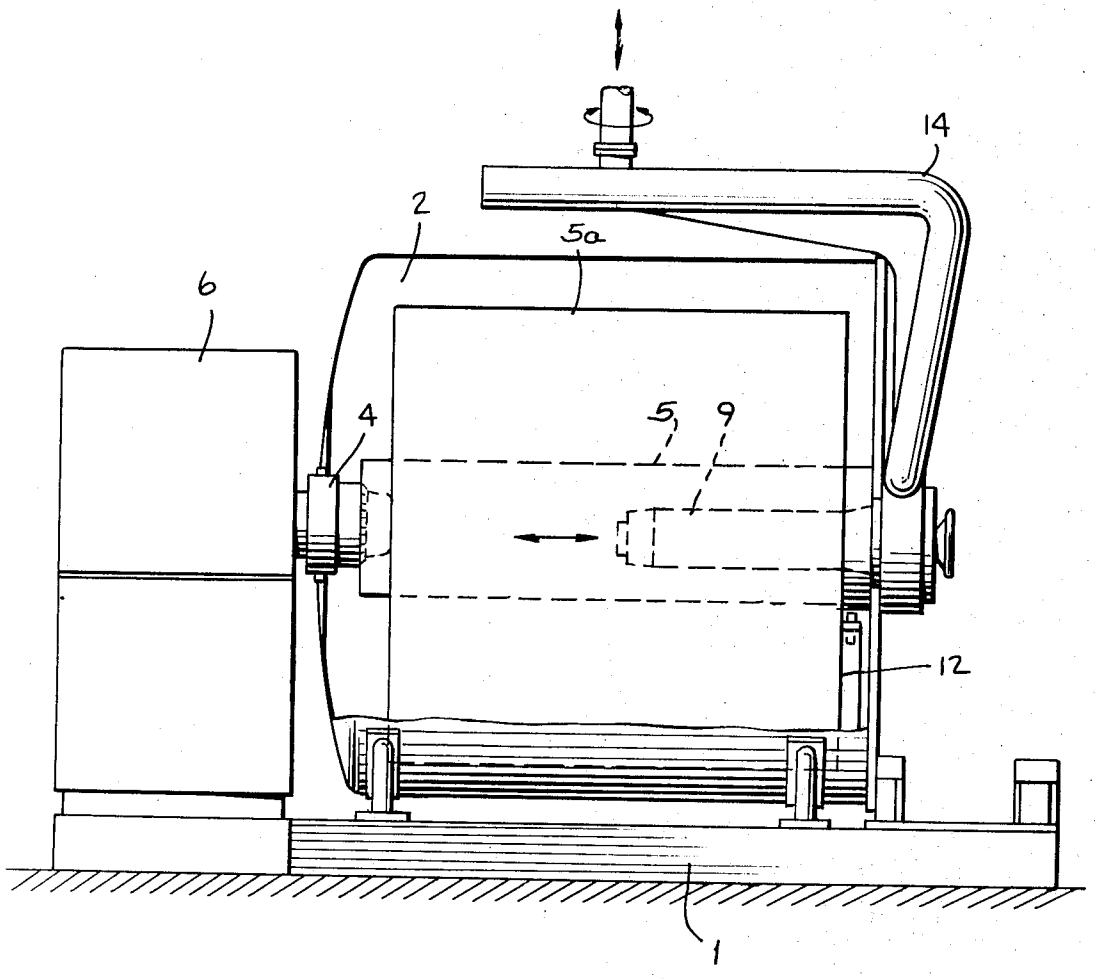


Fig. 5.

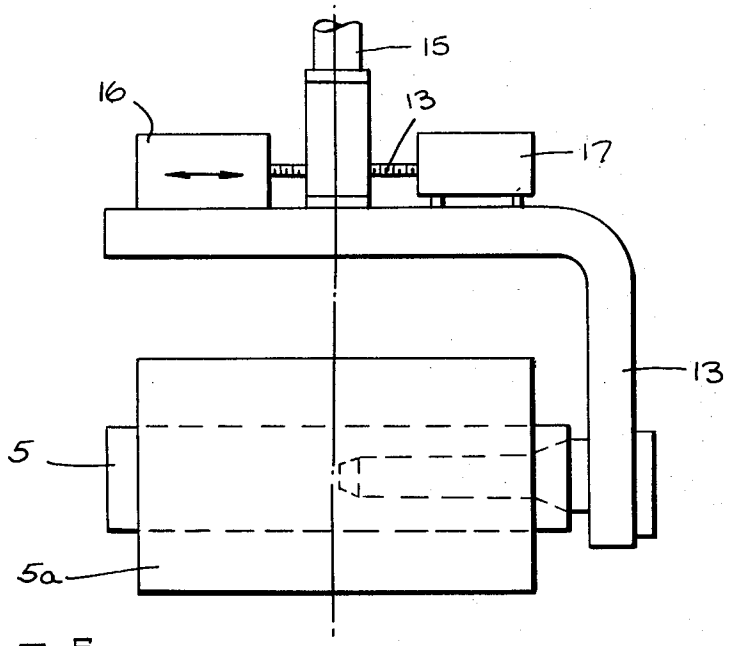


Fig. 6.

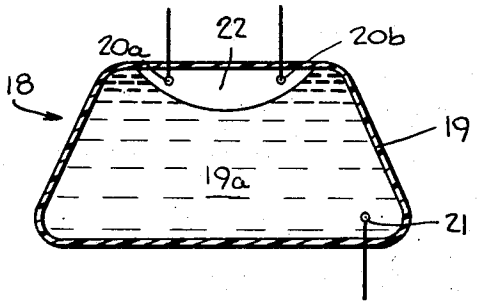
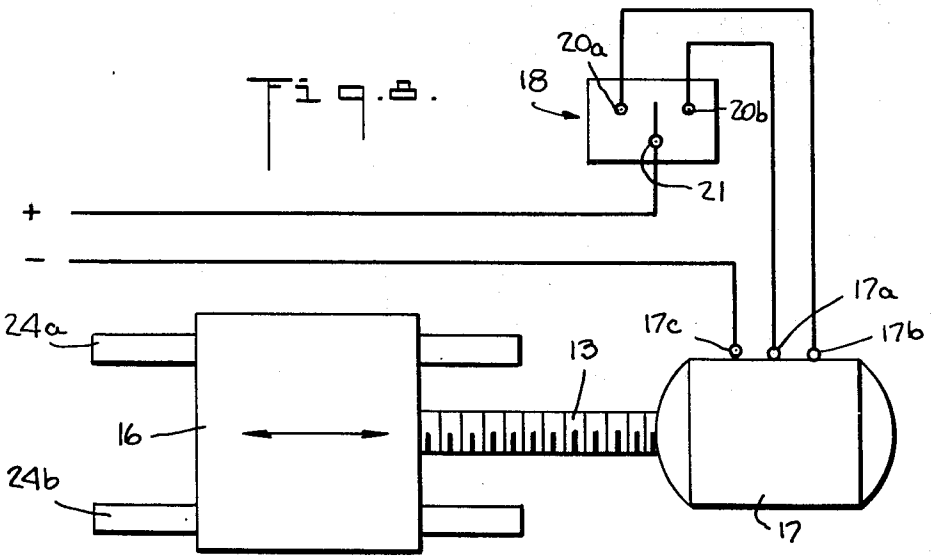


Fig. 7.

Fig. 8.



APPARATUS FOR TREATMENT OF YARNS AND WEB-LIKE MATERIAL

The present invention relates to a machine for treatment of textile material, and more particularly to full-width treatment of yarns or web-like material wound onto perforated beams for liquid or gas contact. The material is subjected to the process under rotation in a treatment chamber, and patents of interest in this field include U.S. Pat. Nos. 3,233,437; 3,413,080 and 3,357,212.

Known machines of this type have employed a support and transport device for the beams, which device is inserted into the treatment chamber together with the beam and on which the beam remains during treatment.

The disadvantages of the above type of apparatus primarily reside in the complicated and expensive construction of the chamber which must be equipped with large hingeable doors for inserting the transport device, as in U.S. Pat. No. 3,357,212, and in the complicated construction of the transport device, most parts of which are exposed to the atmosphere of the chamber and so must be inert to it; and in the fact that such chambers with unavoidably large hingeable doors, which may divide the chamber longitudinally into two chamber sections pivotally connected to one another, cannot easily be made tight for higher pressures so that the known principles of high pressure and vacuum treatment cannot be used on this type of apparatus.

Furthermore, it is also known to insert the beam into the treatment chamber by means of a transport car while it is supported, in the chamber, by rails provided on the walls of the chamber. A disadvantage of this arrangement resides particularly in the complicated construction of the chamber necessary to assure stability thereof since it must support the whole weight of the beam. Furthermore, the beam cannot be fixed on the supports, but only lies on the rails so that only relatively low speeds of revolution can be used in the operation of such equipment.

It is a purpose of the present invention to avoid these disadvantages and to create a machine for full-width treatment which, while calling for far less complicated constructions, as a whole, may be used for high pressure solvent or vacuum treatments, for example.

Thus, according to the present invention, this problem is primarily resolved by providing a self-supporting machine frame on which the chamber has been fixed; and, on the frame, two supports extending from the exterior into the chamber for receiving the beam from the holder. The beam is supported at both ends for rotation during treatment, and the drive is arranged in rigid connection with the frame and engages with the beam over at least one bearing.

By the use of a machine frame supporting the chamber and the beam, the advantageous construction of essentially lighter chambers of more simple construction is made possible. Furthermore, the chambers may be exchanged as desired for special processes provided that, as mentioned above, the connection between the chamber and machine frame can be detached accordingly.

The insertion of the beam into the chamber is essentially simplified, according to the present invention, if the holder is only engaged with a bearing on one side of the transport device. It is particularly advantageous

if, for insertion of the beam into the chamber, one bearing of the machine frame and at least part of the chamber wall associated therewith can be pivoted or hinged away so that rapid and safe insertion can be assured by a support such as a second bearing on the machine frame for maintaining the beam during the period after insertion and while the transport device is detached and before the first bearing is hinged back to engage and help to support the beam.

A further reduction of the equipment necessary for fabric treatment can be obtained if the holder is a movable carriage, the chassis of which extends under the beam and which, on one side, is provided with a base associated with a support arm onto which the beam can be stacked, using one of the bearings, so that winding-up of the fabric width to be treated, transporting same to the treatment chamber, and the insertion into the chamber is possible with one and the same apparatus. It must, however, be pointed out that, contrary to the known carriages movable into the chamber, after insertion of the beam into the chamber, the carriage is removed and is therefore again at disposal for the next wind-up operation, whereby economic use of the factory means is assured.

The insertion is furthermore facilitated by arranging the support arm and the bearings on the machine frame at the same level. Additionally, the reach of the machine frame is such that there is sufficient space below the chamber for insertion of the freely projecting beam into the open chamber, the part of the chassis extending under the end of the beam being able to pass under the chamber or the frame.

According to the present invention, for the transport of the beam, a spacial crane hook may also be provided, and this may be so suspended and arranged relatively to the beam that torsional moments are greatly reduced. It has been found, however, that in most cases, the beams with wound-up material thereon, are not wound exactly regularly, i.e., exactly symmetrically, so that the point of suspension is thus charged by different torsional moments, and the horizontal position of the beam is not exactly kept.

These differences, depending on the direction in which they are produced, cause difficulties in stacking the beam onto the bearing in the chamber or upon removal of the crane hook so that disturbances in operation are to be expected or surveying personnel must be engaged.

Thus, I have devised means to assure, in any case, the automatic conservation of the desired position of the beam suspended from the crane hook. The problem is primarily resolved by providing, on the crane hook a position sensor for finding out the suspending position of the beam, and on the crane hook, an equilibrating weight movable by means of a motor is provided, so that the position sensor is coupled with the motor for activating the same and proportionally displacing the equilibrating weight if the crane hook is asymmetrically charged. The motor may be any driving apparatus, such as an electric motor or a pneumatical device.

As position sensor, e.g., a switch which preferably, under the influence of gravity in certain positions, causes, by activation of the motor, the displacement of the equilibrating weight until the desired change of position of the beam is reached. Preferably, the sensor is a mercury switch of the water level-type, contacts

being provided at certain locations which may be short-circuited by the mercury.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent construction as do not depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification wherein:

FIG. 1 is an elevational view of the machine for full-width treatment according to the present invention;

FIG. 2 is a lateral view of the holder with a beam placed thereon;

FIG.3 illustrates a machine and holder during insertion of the beam;

FIG. 4 is similar to FIG. 1, but with an exchanged treatment chamber;

FIG. 5 shows the machine of FIG. 1 with a crane hook as holder;

FIG. 6 is a schematic view of a beam suspended on a crane hook;

FIG. 7 is a mercury sensor switch; and

FIG. 8 is a block schematic of a circuit used for crane hook control.

The machine for full-width treatment contains an approximately U-shaped self-supporting machine frame 1 on which an exchangeable chamber 2 is fixed by securing means 3. Bearings 4, provided on the frame 1, are engaged with the chamber 2 on both sides for receiving the beam 5, whereby the passage through the chamber 2 is made fluid tight. The jacket surface of the beam 5 is perforated to render possible the treatment of wound-up material 5a by the feeding of fluid in the beam during the rotation of both the jacket and beam. The wall 2a of chamber 2 can be pivoted or hinged away together with the bearing 4 associated therewith (FIGS. 3 and 5) so that the beam 5 can be inserted for treatment purposes, the driving device 6 rotating the beam 5 via the bearing 4.

FIG. 2 shows the holder, in this case a carriage 8, which, on one side, supports the beam 5 with the support arm 9 fixed on the base 10.

According to FIG. 3, the frame 1 is of such construction that the chassis 11 can be moved, during insertion of the beam 5, into chamber 2, until the beam 5 is engaged with bearing 4 to the left, as viewed. In order to support the beam 5 after detachment and withdrawal of the carriage 8, a support 12 is provided which, until the wall 2a is closed and the bearing 4 is engaged, receives half the weight of beam 5.

FIG. 4 shows the machine of the present invention with an exchanged chamber which, for insertion of the beam 5 by means of a crane, can be hinged upwards.

FIG. 5 shows a holder in the form of a crane hook 13. The crane hook is equipped with a bent support 14 which is fixed on the support arm 9 and the suspension point of which is arranged above the beam such that the fixation is maintained with a minimum of torsional moments. Thus, by way of example, when viewed from above, the support 14 may be in alignment with the beam, but spaced from it and suspended approximately above the center of the beam.

As stated, the beam is sometimes wound asymmetrically so that when the crane hook is used, additional means is needed to conserve the desired position of the beam. Thus, as shown in FIG. 6, a beam 5 with wound-up material 5*a* is suspended on a crane hook 13. The crane hook is thus bent over the beam so that the point of suspension 15 lies vertically through the center of gravity of the whole system so that the suspension normally is free from torsional moments. For compensating torsional moments, which may be caused by unexact formation of the wound-up material 5*a*, an equilibrating weight 16 is provided which can be horizontally shifted by motor 17 until the system is in equilibrium.

FIG. 7 shows a mercury switch 18 which essentially consists in a fluid-tight enclosure 19 for receiving the mercury filling 19*a* and the contacts 20*a*, 20*b* and 21. As long as the switch 18, as shown, is horizontal, the contacts 20*a*, 20*b* are in the zone of an air bubble 22 so that there is no connection between contact 21 and either contact 20*a* or contact 20*b*.

Any movement of the switch 18 out of the horizontal position will, however, visibly cause a contact whereby, according to the direction of movement, either contact 20*a* or contact 20*b* is connected with contact 21.

The switch 18 is directly arranged on the crane hook 13 and makes part of a circuit shown in FIG. 8 between a current source and a motor 17.

In operation, if asymmetrical charging causes slight displacement of the hook 13, e.g., in clockwise direction, whereby the bubble 22 is slightly displaced to the left, contact 21 is connected with contact 20*b* and current fed to the input 17*a* of motor 17 which is provided for moving the weight to the left. Since the clip 17*c* is already connected with the voltage source (not shown), upon contacting of the switch 18, motor 17 is immediately activated and effects shifting of the equilibrating weight 16 to the left on the guide rails 24*a*, 24*b* until equilibrium of the whole system is restored and, because of return of the switch 18 into the horizontal position, the connection between contact 20*b* and 21 is interrupted, whereby motor 17 is deactivated.

It can be seen that the function caused by irregular formation of the wound-up material in opposite direction is identical with the only difference that a connection between contacts 21 and 20*a* (instead of 20*b*) takes place, whereby movement of the weight to the right is effected by motor 17 by connection with connection 17*b* so that the equilibrating weight 16 is moved in opposite direction.

I believe that the construction and operation of my novel treatment apparatus and beam control will be understood and that the advantages thereof will be fully appreciated by those persons skilled in the art.

I claim:

1. A machine of the class described for treatment of a material wound onto a perforated beam which comprises:

a treatment chamber for receiving said beam;

a self-supporting frame on which said treatment chamber is mounted;

bearing means provided on said frame to extend into said treatment chamber at opposite ends thereof for rotatable support of said beam;

a movable holder having a horizontal support arm fixed thereon, said support arm being adapted to carry said beam to insert said beam into said treatment chamber in such manner so that said beam is engaged with and supported by one of said bearing means; and

a motor drive rigidly supported on said frame and engagable with said beam via one of said bearing means to impart rotational movement to said beam.

2. Machine according to claim **1,** wherein said chamber is removably mounted on said frame and is secured thereto by securing means.

3. Machine according to claim **1** wherein one section of said frame which carries one of said bearing means and at least one section of the associated chamber wall is pivoted whereby said sections may be opened to permit insertion of said beam into said chamber.

4. Machine according to claim **3** wherein said frame includes an auxiliary support means adapted to support said beam when said frame and wall sections are pivoted open.

5. Machine according to claim **1** wherein said movable holder comprises a carriage having a chassis extending under said beam; a perpendicularly extending base and a horizontally disposed support arm mounted to said base, said support arm being adapted to extend partially within said beam.

6. Machine according to claim **5** wherein said support arm is mounted to said base at the same level as said bearing means.

7. Machine according to claim **5** wherein said frame is dimensioned under said chamber to receive said chassis whereby said chassis can be shifted to adjust said beam during its insertion into said chamber.

8. Machine according to claim **1,** characterized in that the holder is a crane hook provided with at least one bearing.

9. Machine according to claim **8,** in that the crank hook **(13)** presents a horizontally extending support arm **(9)** engageable with the bearing from one side which is fixed on the vertical section of a bent support **(14)** which, when viewed from top, is in the same line as the beam **(5)** at a certain distance above the same and is suspended approximately above the center of the beam at such a distance from the bearing of the beam that the point of suspension is free from torsional moments.

10. Machine according to claim **9,** in that sensing means **(18)** are provided on said crane hook for determining the position of said beam **(5),** a shiftable weight **(16)** is arranged on said hook and motor means is coupled with said sensing means for proportionally displacing said weight upon asymmetrical loading of said crane hook to maintain same in a desired position.

11. Machine according to claim **1,** in that the chamber **(2)** presents a closable opening on the top for inserting the beam **(5)** by means of a crane.

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